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22a. NAME OF RESPONSIBLE INDIVIDUAL
Judy Clark

22b. TELEPHONE (Include Area Code)
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ABSTRACT

Preservation of the environment has become an issue of primary importance worldwide; hence, American industry can expect a future in which public and private sector insistence on environmentally safe products--already high--will rise steadily and increasingly determine economic viability. This report focuses on the causes and effects of air pollution and the requirements of the Clean Air Act Amendments of 1990. To survive in today's environmentally sensitive atmosphere, companies must recognize and accept that the environment has become deeply entrenched as one of the central concerns of the American consumer. Moreover, to be successful, companies must be willing to make substantial organizational and operational changes. Several strategies for survival are suggested. Although the task will not be easy, the companies that succeed will find themselves among the most respected and profitable in the world.

1993
Executive Research Project
RS1

Strategies for Survival in the New Environmental Era

Louisa H. McAllister
Department of the Navy

Faculty Research Advisor
Lieutenant Colonel Cecilia C. Albert, USAF



The Industrial College of the Armed Forces
National Defense University
Fort McNair, Washington, D.C. 20319-6000

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National Defense University
Fort McNair, Washington, D.C. 20319-6000**

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STRATEGIES FOR SURVIVAL IN THE NEW ENVIRONMENTAL ERA

Where there is no vision people perish.

Proverbs 29

PART I

INTRODUCTION

As photographs from outer space vividly remind us, all of humanity shares one planet and its surrounding protective air mass. However, many of our human activities have produced life-threatening changes to our protective atmosphere. A German astronaut, looking from space at the earth, said "For the first time in my life I saw the horizon as a curved line. It was accentuated by a thin seam of dark blue light--our atmosphere. Obviously this was not the ocean of air I had been told it was so many times in my life. I was terrified by its fragile appearance."¹

Preservation of our "fragile" environment has become an issue of primary importance worldwide. Since the inception of the first environmental era in 1970, support for the movement has been broad and vigorous among Americans. Increasingly through the years, Americans have come to favor many new regulations to protect themselves and the environment. A Gallop poll found that between 1967 and 1971, there was a 19 percent increase in the proportion of Americans willing to pay \$15 more in taxes to combat pollution.² In May 1989, a Media General/Associated Press poll found a majority of Americans favored a wide variety of environmental measures including a "ban on household aerosols, strict emissions controls at power plants, urgent action (no matter what the cost) to clean toxic waste . . . [and] strict smokestack controls at oil- and coal-burning power plants (even if

electricity prices would rise). . . ."³ Further, in a 1989 telephone poll, 80 percent of respondents indicated "continuing environmental improvement must be made regardless of cost."⁴

The purpose of this paper is to assess the implications of this new environmental era for American industry. There are a vast array of environmental problems, both national and international, and numerous statutory and regulatory requirements applicable to each. However, since atmospheric pollution is the most universal of environmental problems--respecting no state or national borders--I have focused this review on pollution of the atmosphere and its major ecological, economic and health impact. In the following sections, I will address--

- o public and private sector pressures;
- o pollution and its effects;
- o key statutory and regulatory pollution control requirements; and
- o implications for American industry.

Finally, by drawing conclusions from the research, I will suggest some environmentally related business strategies for surviving and prospering in the 1990s and beyond.

PART II

PUBLIC AND PRIVATE SECTOR PRESSURES

Prior to the 1960s little attention was given to the environment by either the public or private sector. However, during the 1960s as people became more aware of the impact of environmental problems, particularly air pollution, public support for environmentalists grew. This heightened public awareness began a course of action which ultimately led to the first significant clean air legislation--the Air Pollution Prevention and Control Act later renamed the Clean Air Act.⁵ This Act and its subsequent amendments will be discussed in detail later. The United States further recognized the overarching environmental issue in 1969 with the enactment of the National Environmental Policy Act. Its purpose was--

. . . to declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the nation; and to establish a council on Environmental Quality.⁶

However, the subsequent environmental statutes enacted during the 1970s, most particularly those involving control of toxic substances and pollution, were primarily the result of environmental advocacy groups, media publicity, and public sentiment. The 1970s, referred to by some as the "environmental decade," fostered a public consciousness of environmental degradation and created a broad public opinion on the need for governmental restoration and protection of the environment.

The environmental statutes enacted during the 1970s reflect an exceptional accomplishment for the U.S. particularly when compared to the early 1980s. The early years of the Reagan administration were marked by a virtual gridlock in the area of environmental policy. Although public opinion surveys indicated strong public support for environmental protection, the perilous state of the economy and national defense were evidently of greater concern in voters' minds when they elected Reagan. Under Reagan, government policies were limited to a few overriding economic and political objectives. Environmental programs received little attention and largely were seen as targets for deregulation.⁷ The gridlock eased somewhat in the mid- and late 1980s when environmental concerns surfaced as a prominent item on the international political agenda. Among the significant events that redirected U.S. concern to environmental issues were--

- o the Three Mile Island accident;
- o the 1988 drought and heat wave which heightened the anxiety over "global warming,"
- o the environmental catastrophes in Bhopal and Chernobyl, and
- o the worst oil spill in U.S. history.

During the past few years, environmental quality has continued to attract unprecedented attention. This heightened interest is due, in part, to industry recognition of the spiraling environmental concerns expressed by consumers for preserving the environment (including their willingness to favor manufacturers of environmentally "safe" products). It is also due to increasingly vocal "green" consumers and voters. A United States "green" movement, founded in 1984, became

a national political party in 1991. The Green Party USA, a grass-roots party focused on environmental and social justice issues, gained 13 seats in the recent November 3, 1992 election, bringing its representation to 58 seats in 14 state legislative bodies.⁸ In addition there are strong national lobbies and think tanks in Washington devoted to pursuing environmental issues.

Although there are intense political differences over specific environmental policies, the decade of the 1990s promises to be a period of major change in environmental politics. Environmental protection has moved into the mainstream of political life. In a recent Roper poll, when asked what they believe is important in the 1990s, eighty-five percent of Americans responded that the environment is the most serious issue.⁹ According to a Wall Street Journal/NBC News Poll released in August 1991, eight out of ten Americans identified themselves as "environmentalists."¹⁰ Moreover, it is rare to find an elected official who does not profess to be an environmentalist. According to one pollster, "protection of the environment, in fact has become . . . a basic American value--with no consequential voting block opposed to it."¹¹ Despite strong environmental protection sentiment, it should be noted that specific environmental issues, like many other issues facing congress and the public, evoke strong parochial concerns which initially override concern for the good of the nation and the world. Fortunately, in most areas dealing with the environment, the voters speak and concern for the universe prevails.

Environmental issues vary widely in their social and economic consequences. Nonetheless, it appears clear, based on numerous polls and other means of taking the

country's pulse, that Americans are willing to face the economic and social consequences of ensuring a clean and safe environment. The concern voiced by Americans is becoming a powerful force in focusing congressional attention on environmental issues. The rise in membership in America's environmental groups is reflective of society's increasing concern. For example, Greenpeace's membership has increased by 50 percent since 1988 and the Natural Resources Defense Council has almost doubled its membership since the early 1980s.¹² Environmental protection is a nonpartisan, cross-generational, global cause and given the enormity of the task faced in stemming the environmental degradation of the planet, the cause has an assured durability.

PART III

POLLUTION AND ITS EFFECTS

Damaging air pollution was the first international environmental issue of our times. It permeates the globe regardless of its country or state of origin. Had the U.S. not invested in some pollution prevention in the 1960s and 1970s, this country in all likelihood would be facing the staggering human health and ecological problems that currently pervade eastern Europe. The exquisite statues from Dresden to Prague, that attracted millions of tourists, are now being destroyed by acids in the atmosphere. The most extreme example of eastern European environmental deterioration is in Poland where entire villages have been abandoned because of local environmental conditions. In 1984 an estimated 71 per cent of Poland's water supply was not drinkable and approximately 30 per cent of the Polish population live in areas classified as environmental disaster zones. Just to contend with the current environmental problems will cost the Polish economy an estimated 10 to 15 percent of its gross national product.¹³

There are countless pollutants in our air. However, the following are the major air pollutants¹⁴ produced in large part as a result of human activities.

Major Air Pollutants

Carbon Monoxide (CO). A toxic gas that can escape from clogged or leaking furnaces, chimneys, and car exhaust fumes. It contributes indirectly to the greenhouse effect and ozone depletion. Vehicle exhaust accounts for nearly all CO emitted in many urban areas. Levels of CO have been substantially lowered in the

industrialized world via auto emission controls such as the catalytic converters. However, CO level is increasing in most of the developing world as vehicle numbers and traffic congestion rise.

Sulfur Dioxide (SO₂). The largest single source of SO₂ is the burning of fossil fuels to generate electricity. Metal smelting and some industrial processes also create significant SO₂ emissions, as do diesel exhaust fumes. As one of the principal elements in acid rain, SO₂ has potent ecological effects, including direct damage to plant foliage and indirect disruption of ecosystems through acidification of soils and surface waters. SO₂ also poses human health problems. It can be a dangerous respiratory irritant and can impair lung function. Most industrialized nations lowered SO₂ levels by 20 to 60 per cent between 1975 and 1984 mainly by imposing stricter industry and automobile emission standards. Major SO₂ reductions also have come from burning coal with lower sulfur content and from using less coal to generate electricity.

Particulates. Particulates include smoke, soot, dust, and liquid droplets emitted from fuel combustion, industrial processes, agricultural practices, or a number of natural causes. Condensation of gases such as SO₂ and volatile organic compounds (VOCs) are also a significant source of particulates; roughly half of all human caused particulates arise when SO₂ is transformed in the atmosphere to sulfate particles and fall to the earth as microscopic dry acid or mix with moisture in the air and fall as "acid rain."

Volatile Organic Compounds (VOCs) (Hydrocarbons). Emissions of VOCs from human sources are primarily the result of incomplete combustion of fossil fuels. In the lower atmosphere, sunlight causes VOCs to combine with other gases, such as nitrogen dioxide, oxygen, and CO to form ozone, peroxyacetyl nitrate (PAN) and other types of photochemical oxidants. These active chemicals react with other substances and can damage human health and vegetation.

Nitrogen Oxides (NO_x) NO_x is used to refer to both nitric oxide (NO) and nitrogen dioxide (NO₂). About half of human-produced NO_x is emitted by motor vehicles and about a third comes from power plants; most of the rest is produced by industrial operations. Statistics gathered in 1989 (Figure 1) indicate that compared to Western European countries, the U.S. had the highest total of per capita emissions of nitrogen dioxide, a significant contributor to "acid rain."¹⁵

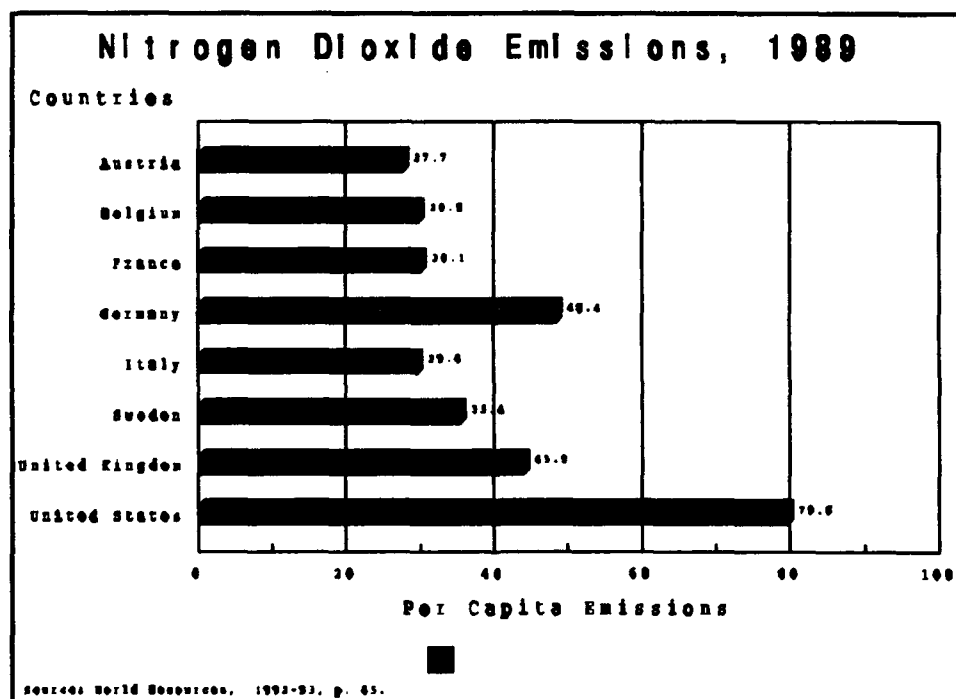


Figure 1

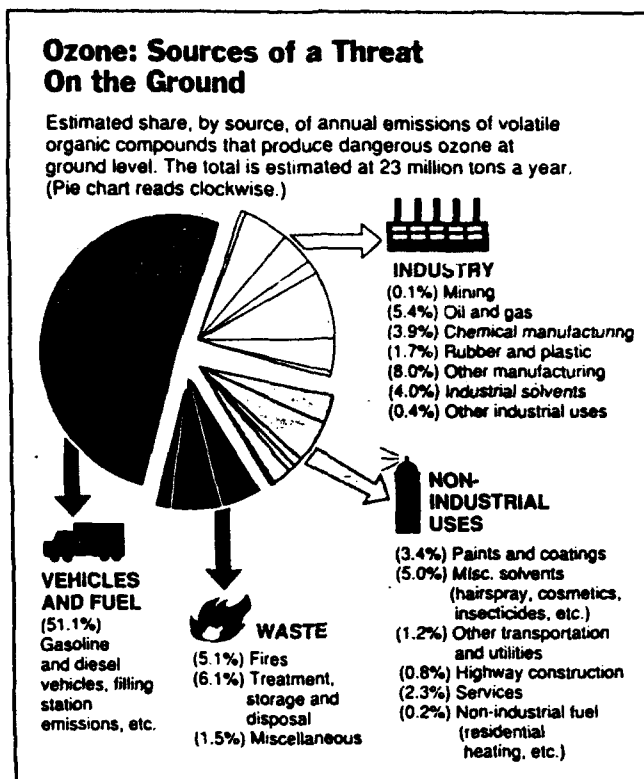
Carbon Dioxide (CO₂) and Chlorofluorocarbons (CFCs). Produced mainly by burning of fossil fuels, atmospheric CO₂ absorbs radiant heat from the earth and is a major contributor to global warming. CFCs are synthetic chemicals produced for use as aerosol propellants, refrigerants, solvents, and as foam-blowing agents. CFCs are the major cause of ozone depletion.

Effects of Air Pollutants

For generations, we have taken for granted that the atmosphere will protect us from the sun's most harmful rays, provide a moderate and stable climate, and renew and cleanse itself to provide fresh air to breathe. Now however in the face of persistent and growing problem of air pollution, the stability of the earth's atmosphere can no longer be taken for granted. Some effects of air pollution may have disastrous consequences. As such, they are of particular concern around the globe.

Ground-level ozone. Ozone at ground level is a potentially disastrous effect of air pollutants. (Dangerous ground ozone should not be confused with ozone in the stratosphere which occurs naturally and protects the earth from receiving excess ultraviolet radiation.) Ground-level ozone is the main component of smog--formed in the lower atmosphere whenever emissions of NO_x and VOC are present to react in sunlight. Probably the most damaging impact is in the quality of air we breathe. Nearly 100 major U.S. cities have not complied with existing regulations in the emissions of the precursors of smog, i.e., ozone and carbon monoxide.¹⁶ As indicated in Figure 2, the major sources of dangerous emissions are vehicles and fuel.¹⁷

Figure 2



Source: The New York Times Co., reprinted in Managing Environmental Affairs, Rpt. No. 961

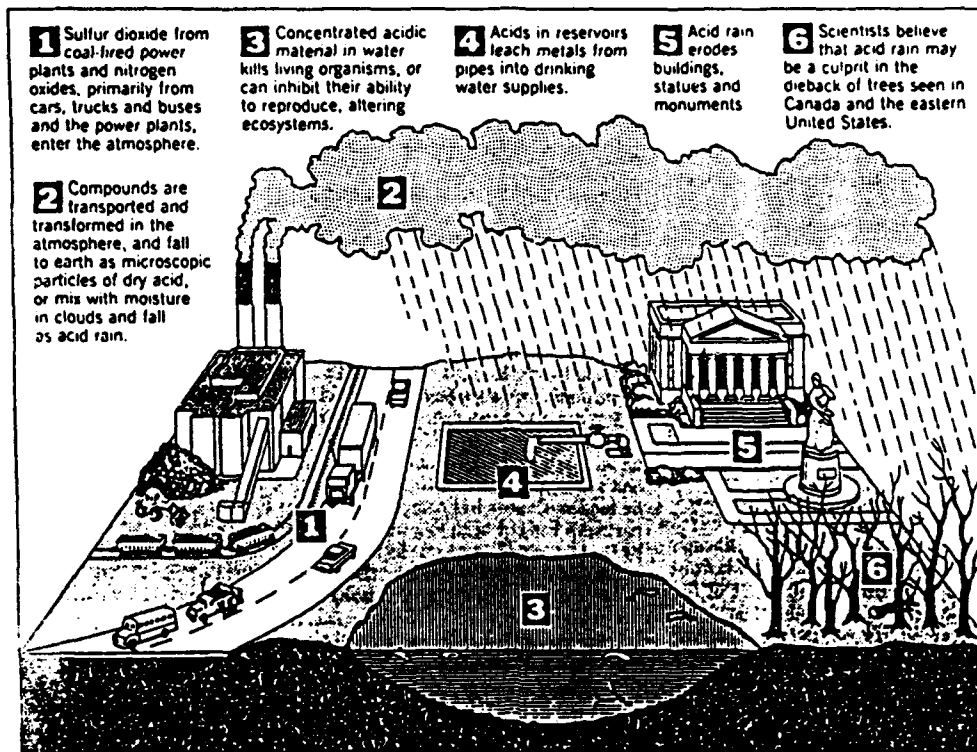
Ozone depletion. As indicated earlier, stratospheric ozone protects the earth from the sun's ultraviolet rays. An increase in the amount of ultraviolet radiation reaching the earth can lead to serious health problems, e.g., melanoma and non-melanoma skin cancer, eye damage and suppression of the immune response system. Many believe the depletion of ozone could also change the temperature in the atmosphere and lead to global climate changes, i.e., "global warming."¹⁸

Acid rain. Acid rain is linked to the degradation of fresh water, forests, soils, and building material. According to the Environmental Protection Agency (EPA), the cost of repairing or replacing structures damaged by acid rain is estimated at more than \$5 billion annually.¹⁹ Figure 3²⁰ provides a schematic designed to explain the acidic damage caused by air pollution. Acid damage and ozone depletion are the primary suspected causes of crop damage and forest decline in the U.S., Canada, and

Europe. While the total cost of acid raid is difficult to judge, it is estimated that in the U.S. the damage to forests, agriculture, and aquatic resources may exceed \$5 billion annually.²¹

Figure 3

Understanding Acid Deposition



Source: *The Washington Post*, March 19, 1987, p. A25.

PART IV

KEY STATUTORY AND REGULATORY REQUIREMENTS

General

U. S. Federal environmental statutes²² generally fall into three main categories:

- o pollution control,
- o land use and resource conservation, and
- o environmental restoration and cleanup.

Pollution control statutes govern:

- o air pollution
- o water pollution
- o ocean dumping of wastes/dredge material
- o noise pollution
- o pesticide pollution
- o hazardous and non-hazardous waste management.

In enacting federal pollution control statutes, Congress contemplated a "state-federal partnership." To carry out this concept, complex federal programs were created which included a mechanism to shift regulatory and enforcement responsibilities from federal agencies to the states. Under each pollution control program it is unlawful to emit, discharge, or dispose of pollutants unless--

- o they are specifically waived (e.g., old cars, city services, etc.), or
- o they are below specified levels, or
- o the required permit is obtained from the appropriate regulatory body.

Air Pollution

The primary air pollution control requirements are contained in the Clean Air Act (Pub. L. 84-159 (as amended)(42 U.S.C. 7401 et.seq.) The original pollution control legislation enacted in 1955, was replaced by the Air Quality Act of 1967 (Pub.

L. 90-148), now referred to as the Clean Air Act. The 1990 amendments to the Clean Air Act (Pub. L. 101-549) are sometimes referred to as the "Clean Air Act of 1990."

The purposes of the Clean Air Act (as amended) are--

- o "to protect and enhance the quality of the Nation's air resources so as to promote public health and welfare and the productive capacity of its population," and
- o "to encourage and assist the development and operation of regional air pollution control programs."²³

The Act stipulates that prevention and control of air pollution is the primary responsibility of the state and local governments. Further Congress called for the creation of a number of separate programs within the Act. Two major programs address pollution emitted by motor vehicles (mobile sources) and by industrial plants and municipal facilities (stationary sources). The goal of these programs is the attainment and maintenance of healthful air in the United States. "Healthful air" is defined by reference to national ambient air quality standards (NAAQS) for certain pollutants of public health concern. The Environmental Protection Agency (EPA) identifies the pollutants and sets the primary and secondary NAAQS which, in its judgment, adequately protect the public health and welfare.²⁴

Clean Air Act Amendments of 1990

In the 1990 Clean Air Act Amendments, Congress authorized the broad use of economic incentives in state and local air quality plans, as well as in federal rules for reducing emissions of hazardous air pollutants, acid rain precursors, and ozone-depleting chemicals. The final version of the amendments--the result of thirteen

years of intense debate--is divided into seven main titles dealing with:

- o ambient air quality (smog);
- o motor vehicles and alternative fuels;
- o toxic air pollutants;
- o acid rain;
- o permit requirements and conditions;
- o stratospheric ozone depletion; and
- o enforcement requirements and penalties.²⁵

The primary objectives of the amendments are--

- o to require most cities to comply with health standards by the year 2000.

States must comply with new annual progress requirements and emissions reductions from motor vehicles and fuels as well as from factories, refineries, consumer products, paint shops, and dry cleaners. Failure to comply will result in loss of federal funds.

- o to reduce acid rain to protect our aquatic resources; buildings, statues and monuments; and public health. The amendments call for a 10 million ton reduction in SO₂ emissions from older power plants, and a two million ton reduction in NO_x from sources such as utilities and automobiles. To achieve these standards, the amendments require all electric utilities to participate in achieving a 50 percent reduction. As an incentive to reduce its emissions by more than 50 percent, a power plant can sell pollution "credits" to another plant that otherwise might have to spend more to meet the federal standards.

o to reduce by 2.7 billion pounds the amount of air toxics that are emitted annually. In addition to major health problems such as cancer, air toxics cause major problems for our ecosystems. For example, a 1989 survey of almost half the 2,700 lakes in New York's Adirondack Mountains revealed that one-quarter of the lakes were so acidic that most could not support fish and an additional one-fifth were so acidic they were "endangered."²⁶

o to aggressively phase out CFCs and other chemicals that contribute to the deterioration of the stratospheric ozone layer. As mentioned earlier, damage to the ozone layer poses serious threats to public health.

The Clean Air Act Amendments also set forth a sophisticated market mechanism for incentivising pollution control using transferable emission discharge permits or credits. First, an overall emissions cap is set within a region, and permits are required for all emissions. If a facility reduces emissions further or more quickly than required, it earns emission "credits" that can be applied to future emissions or sold to others. The owners of other facilities can then opt to purchase these credits to cover their emissions or take abatement measures themselves, with whatever technology they choose.²⁷

Cleaning up the air will not be without cost, however. In 1992, the President's Council of Economic Advisors estimated the annual cost of achieving these environmental objectives will rise to about \$25 billion by 2005 when all the requirements are scheduled to be implemented.²⁸

PART VI

IMPLICATIONS FOR AMERICAN INDUSTRY

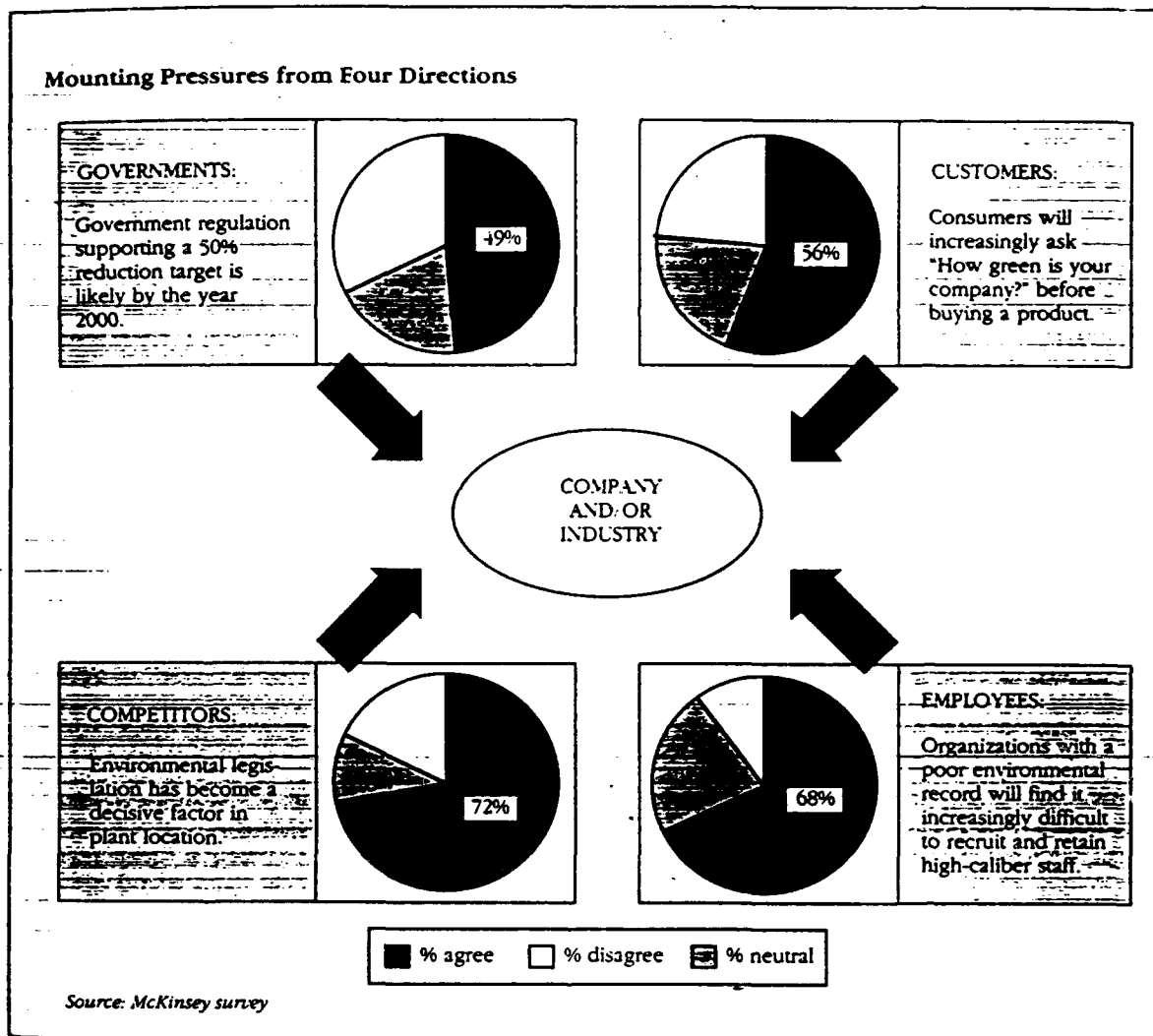
A Matter of Economic Survival

Although industry has traditionally fought new pollution laws, consumer pressure, the media, and the current political climate will force industry to embrace environmentalism. Many business leaders today no longer view environmental action as a choice--but rather as an integral part of doing business. They are recognizing that consumers are increasingly including environmental performance in their evaluation of companies. Any negative environmental concerns about a company or its products may be reflected in purchasing behavior. Consumer surveys conducted in 1991 revealed that more than 50 percent of those surveyed did not buy a product because of concern about its effect on the environment.²⁹

In view of the above, many corporations have established or are establishing environmental policies. From the Chief Executive Officers (CEOs) down through the employee ranks, there is increasing concern and responsiveness to environmental issues. In a 1991 survey of more than 400 senior executives of major companies worldwide, only seven disagreed that the environmental challenge was one of the central issues of the 21st century.³⁰ Faced with increasing pressures (Figure 4),³¹ many business leaders are taking positive action to control pollution. As a result, environmental expenditures are expected to increase from the current average of 2.4 percent of sales to 4.3 percent by 2000.³² Nonetheless, almost half of the 400 senior

executives surveyed in 1991 thought that achieving 50 percent tighter standards by the year 2000 was a realistic goal for their company.³³

Figure 4



Profits and Jobs

Much has been written and reported, both in the public and private sectors, about the negative impact on the economy, including unemployment, of environmental requirements. In addition, the primary opposition by industry has

been based on the belief that effective initiatives to reduce pollution would require significant capital investments and increased operating costs. However, cost/benefit analyses conducted by some of the companies (or their industry associations) revealed that cleaner, "greener" operations could actually save them money.³⁴ For example, the 3M Company's 3P Program (Pollution Prevention Pays) has halved the amount of pollution generated per unit of production and saved the company millions of dollars.³⁵ Another example is Du Pont. After developing products and processes to clean up its own operations, Du Pont discovered it could offset its costs by selling this technology to other firms. Du Pont expects its "environmental cleanup" division to generate \$1 billion in business during the 1990s.³⁶

There are many other examples of progressive companies and entrepreneurs who recognize that the new "environmentalism" is not a passing trend but a fundamental change in American culture.

- o Arco has developed a reformulated gasoline product, and other petroleum companies are following suit.

- o Detroit Diesel Corporation has developed a methanol engine for buses to replace outmoded and heavy-polluting diesel bus engines. Since 1988, its market share has increased from 3 percent to 22 percent.

- o Monsanto has reduced toxic air emissions by 90 percent.

- o Du Pont, in addition to its clean-up business, has developed a new coolant with a dramatically lower CFC content.

- o Nissan has developed new air conditioning systems with no CFCs.

- o UPS and Federal Express are converting their truck fleet from standard gasoline to natural gas in ozone non-attainment areas.³⁷

- o Deere & Company eliminated the use of solvents in its engine manufacturing facility and saved \$380,000 a year in production costs while forgoing the annual release 320 metric tons of solvent vapors.³⁸

The requirement to develop alternative environmental technologies and processes has created a remarkable growth industry in the U.S. and has also created an enormous potential market abroad. Currently the American environmental services industry includes nearly 70,000 businesses, more than a million workers, and a 1991 income of \$170 billion. Based on a standard multiplier effect to measure the full economic impact, economists estimate that 3.5 million jobs flow from the \$270 billion in sales in addition to \$22 billion in corporate profits and \$76 billion in federal, state, and local revenues.³⁹ For instance, the U. S. market for "scrubbers" to remove acid in emissions is now worth \$2 billion annually. In North America and Europe, the pollution control and clean-up market totals about \$240 billion annually and is growing at a rate of 7.5 percent a year.⁴⁰ Further, as the requirement for alternatives to CFCs are phased in there are limitless opportunities for entrepreneurs. For example, converting millions of home appliances--such as air conditioners, refrigerators, freezers, washers and dryers, and water heaters--to CFC alternatives could result in billions of dollars in sales by the year 2010.⁴¹ The EPA estimates that \$160 billion--nearly 3 percent of the nation's GNP--will be spent on pollution control by the year 2000.⁴²

PART VII

STRATEGIES FOR SURVIVAL

Overview

Today American companies face their most difficult task and their greatest opportunity. To survive in today's environmentally sensitive atmosphere, companies must recognize and accept that the environment has become deeply entrenched as one of the central concerns of the American public. Companies that believe they can ignore indefinitely the environmental problems stemming from their production need to be aware that society will not tolerate it. Companies that are still only marginally involved must catch up if they intend to survive and prosper. Moreover, successful American businesses of the 1990s will realize that pollution prevention--as opposed to pollution clean-up--is the most effective and cheapest avenue toward environmental protection. Companies can save on control and management of emissions, reduce the use of raw materials, minimize liability, and lessen the burden of regulatory requirements.

Suggested strategies

The suggested strategies for survival and growth in the new environmental era include--

Personal commitment of the CEO. The CEO can be the single most important driver of environmental excellence. However, the CEO's decision to embrace environmental performance must be communicated all the way down the ranks. Environmental excellence requires everyone's involvement--from top

management to the operator on the shop floor. In addition, CEOs must be receptive to innovative ideas from all employees. In a 1989 survey of U.S., Canadian, and European firms, 75 percent of the companies questioned depend on their own staff to identify key environmental issues.⁴³

Written environmental policy statement. Company support of environmental programs must be clearly set forth as company policy. The policy must be broad enough to encompass long-term goals and well as hold each employee accountable to its principles. Environmental targets should be incorporated into the company operating goals and the relationship between the two should be clearly defined. Examples of three environmental policy statements are included as Attachment A.

Senior management involvement. Top management has a fundamental role in determining the success of a company's environmental goals. Also, top management involvement is imperative in light of the legal and financial liability of environmental legislation. Today, courts are more likely to hold officers and managers liable for civil damages. In some cases, criminal prosecutions have resulted in jail sentences of senior company officials who had no knowledge of the environmental incidents.⁴⁴ In a 1990 study of Fortune 500 companies, almost 40 percent were found to have a corporate officer at the vice president level in charge of environmental affairs. Additional statistics reflecting the corporate level of environmental policy decision-making are included as Attachment B. These

additional statistics are based on a 1989 survey of 1,200 U.S. companies, 1,100 European Community companies, and 535 Canadian companies.⁴⁵

Internal environmental audits. Environmental audits do not yet have recognized rules or standard procedures. Nonetheless, companies need to establish an internal environmental audit process. Some of the reasons for conducting environmental audits are to--

- oo ensure performance is in compliance with Government regulations and company policy;
- oo identify and correct unsafe practices;
- oo review and assess current environmental policies; and
- oo adjust operating and capital budgets.

Research and development. A company's environmental plan must include resources for research and development (R&D). In some industries, R&D is imperative for survival. For example, U.S. auto makers who do not invest in R&D of electric automobiles will likely not be around in 2050. In addition to developing new, environmentally sound products and processes, R&D also encompasses staying abreast not only of the current regulations but also of the status of new regulatory development. R&D also includes assessing market trends and determining competitors' plans for environmentally safe products.

Environmental training. The number and complexity of environmental laws and regulations mandates that the successful firm must have a carefully organized,

comprehensive employee environmental training program. The cost of employee environmental ignorance can be great. As mentioned earlier, environmental offenders are being singled out for substantial financial and criminal penalties. In 1990, EPA collected \$61.3 million in penalties--a 74 percent increase over the 1989 levels. In the same period, criminal fines of \$5.5 million and a total of 62 years of incarceration were meted out to managers.⁴⁶ It is expected that these figures will increase in the coming years. Many companies are recognizing that the key to making correct on-the-job decisions is a well-training, environmentally aware workforce. Employees at all levels who understand the environmental regulations can make more reasonable cost-effective decisions.

Communication with the public. Companies which have successfully incorporated environmental policies should "go public" with their commitment and accomplishments. Communication with the public can include press conferences, public events, and annual meetings/reports. Public affairs and marketing personnel must acquire an environmental sensitivity in both corporate public relations and product advertising. Informing the general public as well as stock holders, of actions the company is taking or has taken to become more environmentally responsible can provide benefits. Some of these are enhanced community relations, consumer association of particular companies with environmental responsibility, and increased attraction of "environmentally conscious" investors.

Summary

Companies that want to survive in the new environmental era must be willing to make substantial organizational and operational changes. Although the task will not be easy, the companies that succeed will find themselves among the most respected and profitable in the world.

END NOTES

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5. Section 317, formerly section 14, of Act July 14, 1955, c. 360, as added by Pub.L. 88-206, § 1, Dec 17, 1963, 77 Stat. 401, renumbered section 307 by Pub.L. 89-272, Title 1, § 101(4), Oct 20, 1965, 79 Stat. 992, renumbered section 310 by Pub.L. 90-148, § 2, Nov. 21, 1967, 81 Stat. 507, and renumbered section 317 by Pub.L. 91-604, § 12(a), Dec. 31, 1970, 84 Stat. 1705, provided that: "This Act (enacting this chapter) may be cited as the 'Clean Air Act.'"
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9. William G. Rosenberg, "The New Clean Air Act of 1990: Winds of Environmental Change," Business Horizons, March-April 1992, p. 34.
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14. The definitions of major pollutants have been synopsisized from a number of sources.

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28. Rosenberg, p. 35.
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30. Pieter Winsemius and Ulrich Guntram, "Responding to the Environmental Challenge," Business Horizons, March-April 1992, p. 12.
31. Ibid, p. 13.
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34. Patrick Carson and Julia Moulden, Green is Gold (Toronto: HarperCollins Publishers Ltd., 1991), p. 94.
35. Ibid.
36. Ibid., p. 40.
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38. "Atmosphere and Climate," World Resources, 1992-93.
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SAMPLE ENVIRONMENTAL POLICY STATEMENTS

Chemical Manufacturers Association¹

- o To recognize and respond to community concerns about chemicals and our operations.
- o To develop and produce chemicals that can be manufactured, transported, used and disposed of safely.
- o To make health, safety and environmental considerations a priority in our planning for all existing and new products and processes.
- o To report promptly to officials, employees, customers and the public, information on chemical-related health or environmental hazards and to recommend protective measures.
- o To counsel customers on the safe use, transportation and disposal of chemical products.
- o To operate our plants and facilities in a manner that protects the environment and the health and safety of our employees and the public.
- o To extend knowledge by conducting or supporting research on the health, safety and environmental effects of our products, processes and waste materials.
- o To work with others to resolve problems created by past handling and disposal of hazardous substances.
- o To participate with government and others in creating responsible laws, regulations and standards to safeguard the community, workplace and environment.
- o To promote the principles and practices of "Responsible Care" by sharing experiences and offering assistance to others who produce, handle, use, transport or dispose of chemicals.

¹ Robert Kennedy. "The Commitment to Corporate Environmental Excellence." Corporate Stewardship of the Environment, The Conference Board, Report No. 982 (New York: The Conference Board, Inc., 1991), p. 10.

Volvo²

- o Develop and market products with superior environmental properties that meet the highest possible efficiency requirements.
- o Adopt manufacturing processes that have the least possible impact on the environment.
- o Select environmentally benign and recyclable material for the development and manufacture of our products.
- o Purchase the same quality materials from our suppliers. If we wish to be clean, we must endorse parallel requirements for suppliers.
- o Strive to attain a uniform and worldwide environmental standard.

² Ibid., p. 23.

CORPORATE ENVIRONMENTAL POLICY DECISION-MAKING

Identification of Decision-Making Level by Frequency of Mention¹

<u>Title</u>	<u>U.S.</u>	<u>Canada</u>	<u>Europe</u>
President or CEO	41%	47%	45%
Chairman or the Bd.	18	11	18
Executive VP	14	7	23
Senior VP	17	15	0
Vice President	15	12	7

Because of rounding, figures do not add up.

Location of the Environmental Policy Function²

<u>Name of Unit</u>	<u>U.S.</u>	<u>Canada</u>	<u>Europe</u>
Specialised unit dealing w/environ- mental affairs	41%	31%	49%
Assigned as a major responsibility to existing corporate function	35	42	38
Corporate committee or task force	9	16	7

¹ Catherine Morrison. Managing Environmental Affairs. The Conference Board, Report No. 961 (New York: The Conference Board, Inc., 1991), p. 15.

² Ibid., p. 16.